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Original Article

A Descriptive National Survey of Post-COVID Experiences of Nigerian Surgical Trainees

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Abstract

Background: Medical training was disrupted during the COVID-19 pandemic, with an unprecedented reduction in elective, emergency surgical, and clinical procedures. This led to great interest in the use of virtual lectures, virtual conferences, webinars, and other technology-based resources such as telehealth consultations. This trend has introduced changes that have transformed surgical training/fellowship. The study aims to explore the transformation in clinical practice and residency training induced by the COVID-19 pandemic in a low- and middle-income country such as Nigeria, and ways of aligning with global trends.

Methodology: This was a quantitative questionnaire-based cross-sectional study. The survey link was distributed through professional WhatsApp® platforms of the residency associations of diverse surgery training institutions in Nigeria, and via email.

Results: There were 157 respondents. Urology (26.1%) and orthopaedic surgery (22.3%) had the highest numbers of respondents. The major cases done after the lockdown decreased COMPARED to the period before the lockdown. The residents using the audio form of telemedicine increased from 48% in the pre-COVID period to 61% in the post-COVID period. The video form increased from 4.5% to 21%, and those using internet Apps for clinical consultation increased from 13.4 % to 31.8%. McNemar's test was significant for the differences in responses before and after COVID for audio telemedicine ($p = 0.011$), video ($p = 0.000$), and internet App telemedicine ($p = 0.000$). In the pre-COVID period, lectures, tutorials, and seminars were frequently delivered in-person (96.2%), while in the post-COVID period, they were predominantly done virtually (74.5%). Pearson's chi-square test showed no significant associations between the stage of training and the responses ($p > 0.05$).

Conclusion: The pandemic affected surgical training for fellowships, hastening the adoption of virtual platforms, simulation technology, remote teaching, and mentorship into many fellowships' curricula, giving rise to a flexible hybrid model of surgical fellowship.

Keywords: Surgery training, Surgery fellowship, COVID-19, Telemedicine, Residency training, Nigeria.

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Introduction

During the COVID era, there was an unprecedented decrease in elective and emergency surgeries, clinical procedures, and disruption of several academic programs in surgery.[1-3] The application of social distancing and the multiple lockdowns during this period heightened these setbacks. Challenges posed by the pandemic exposed some deficiencies in the traditional model of skill acquisition in surgical training. Diverse modifications made to address these challenges during the pandemic accelerated the evolution of surgical training and medical education more broadly. This was apparent in the way surgeons and other healthcare professionals showed immense interest in the utilization of virtual and other technology-based resources in the COVID-19 and post-COVID-19 era.[4-6] There was also a notable surge in telehealth and telephone consultations.[7] This increase in the use of virtual resources was associated with a decrease in attendance at physical programmes, elimination of expenditures on accommodation for international events, the loss of working hours for primary duties, and the loss of expenses.[4,6,8,9] It also improved time management.[4,5,6] The rise in use of digital platforms has thrived beyond the COVID-19 pandemic, serving as a major component of modern surgical training, though the patterns of utilization vary worldwide.

Data on the effects of COVID-19 on the training of surgical residents from low-and middle-income countries is scarce. There is a need to evaluate the effects of COVID-19 on the operative and clinical exposure of residents in surgery, on the changes in clinical consultations, and on the changes in the methods of transmitting surgical education. This is important in a Sub-Saharan country like Nigeria, where the health systems and training programmes were already under stress due to limited resources.

Materials and Methods

Study design: This was a quantitative questionnaire-based cross-sectional study. Ethical approval was obtained from the Health Research and Ethical Committee of the University of Nigeria Teaching Hospital, Ituku/Ozalla, Enugu, with reference number: NHREC/05/01/2008B-FWA00002458-1RB00002323. Data was collected via an online survey using a quantitative questionnaire, which was self-administered as a Google Form [https://docs.google.com/forms/d/1_1XiQSy5xueZHJOkS3q7swUvaonoPfQfdHodAgxDuCk/edit#responses]. The survey instrument was developed based on observed changes in surgical education and training during the post-pandemic period and a review of current literature.

The questionnaire includes demographic data (gender, stage of residency training, years spent in training, the region the training institution is located in), the number and nature of surgeries performed in the pre- and post-COVID periods. The quantitative questionnaire also assessed the use of media/telemedicine for consultation in the pre- and post-COVID period, as well as the use of virtual platforms for lectures or tutorials.

Study Participants: All trainees in the surgery specialty within residency training institutions in Nigeria were eligible to participate in this study. The link to the survey was distributed through professional WhatsApp® platforms of the residency associations of different surgery training institutions, and via email.

This included state and federal teaching hospitals, federal medical centers, and national orthopaedic hospitals. The snowball sampling technique was used in recruiting potential participants, though the sample could suffer from a bias due to the overrepresentation of one or more groups. There was no common platform for all the surgical residents in Nigeria.

Inclusion Criteria: The target population comprises resident doctors training at the membership and fellowship levels in any surgery subspecialty. Completion of the questionnaire was a demonstration of willingness to participate in the study. Participation was voluntary and anonymous. Only residents in active training in institutions accredited for surgical training in Nigeria were recruited to participate.

Exclusion Criteria: Residents in the non-surgical specialties were not eligible to participate. Similarly, trainers, consultants, and house officers were excluded from the study.

Data Collection: The questionnaire was pretested using a pilot sample of 10 respondents to ensure content validity. Thereafter, it was launched online. Upon respondents' submission of the completed online questionnaire, responses were collated in Excel format in the principal researcher's Google spreadsheet. A period of 3 months was allowed from the launch of the survey to its takedown. During this period, repeated reminders were sent to eligible participants to complete the survey once.

Data analysis: The collated data were exported into Statistical Package for the Social Sciences (SPSS, IBM Version 25 for Windows) for analysis. Descriptive analyses were done, and the outputs were presented as frequencies and percentages for categorical variables in charts and tables. Associations were tested using crosstab analyses. McNemar's test was used in comparing paired responses, while Pearson's Chi-Squared test was used in checking for associations between categorical variables.

Results

Table 1: Demographics of respondents

Variable	N	%
Gender		
Female	12	7.6
Male	145	92.4
Total	157	100.0

Subspecialty of Respondent		
Cardiothoracic Surgery	6	3.8
General Surgery	28	17.8
Neurosurgery	13	8.3
Orthopaedic Surgery	35	22.3
Paediatric Surgery	17	10.8
Plastic Surgery	17	10.8
Urology	41	26.1
Total	157	100.0

There were 157 respondents, and 7.6% of them were females, while most of them (92.4%) were males (Table 1). Urology subspecialty had the highest number of respondents (26.1%), followed by orthopaedic surgery (22.3%) and general surgery (17.8%) – Table 1.

Table 2: Information on the training duration of the respondents

Variable	**N**	**%**
Years in Training		
1	21	13.4
2	16	10.2
3	24	15.3
4	29	18.5
5	14	8.9
6	14	8.9
>6	39	24.8
Total	157	100.0

Stage of Training		
Fellowship	74	47.1
Membership	83	52.9
Total	157	100.0

Region Training Institution		
North-central region	21	13.4
North-east region	1	0.6
North-west region	5	3.2
South-east region	102	65.0
South-south region	14	8.9
Southwest region	14	8.9
Total	157	100.0

Only 24.8% of the residents had more than 6 years of surgery training – Table 2. Those who have had 4 years of training by the time of this study comprise 18.5%, those with 3 years of training comprise 15.3%, while those with the least period of training were 13.4% - Table 2. The majority of respondents (52.9%) were junior registrars undergoing training in surgery. There were respondents from all six regions of Nigeria. South-East Nigeria had the highest number of respondents (65%), followed by the North-Central region – Table 2.

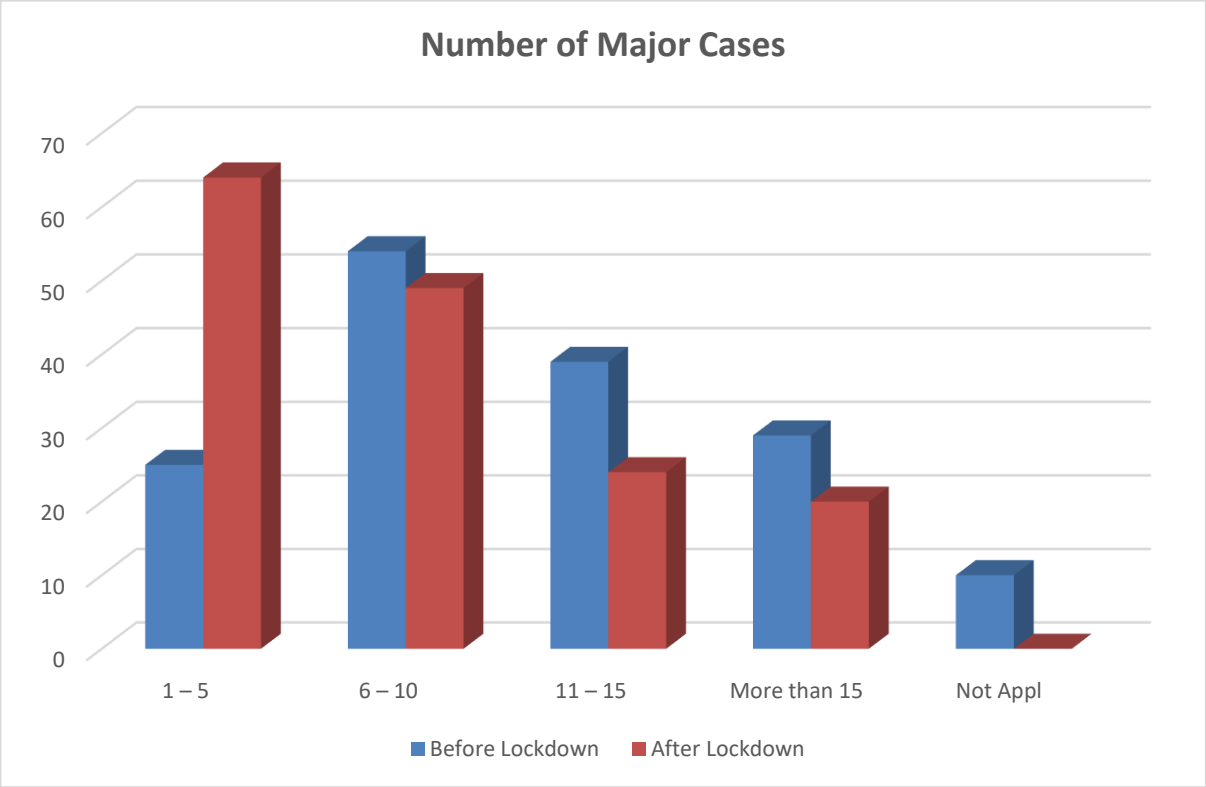

Figure 1: Number of major cases before and after lockdown

The number of major cases performed after the lockdown decreased relative to the period before the lockdown. More respondents said that the average number of cases done before the lockdown was higher: 6-10, 11-15, more than 15 cases – Figure 1. On the contrary, more of the respondents said that the number of cases done after COVID was 1-5 cases – Figure 1.

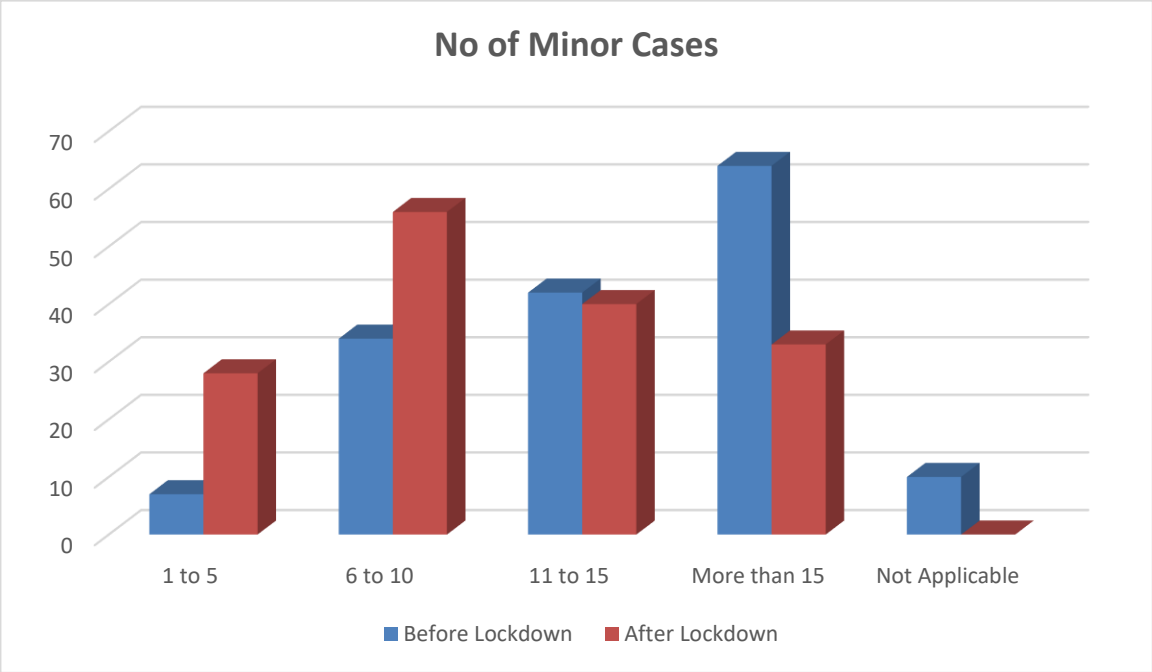

Figure 2: The number of minor cases done before and after lockdown.

More respondents noted that the higher numbers of minor cases were done before the lockdown (11 to 15 and more than 15 cases), and a greater number of respondents said that fewer numbers of minor cases (1 to 5 and 6 to 10 cases) were done after the lockdown, relative to the period before the lockdown – Figure 2.

Table 3: Whether there was an observed difference in minimal access procedures

Difference in Minimal Access Procedures	N	%
A decrease	29	18.5
An increase	24	15.3
I am not certain	32	20.4
No difference	46	29.3
Not applicable	26	16.6
Total	157	100.0

The majority of the respondents (29.3%) declared there was no observed difference in the number of minimal access procedures done in the pre- and post-COVID periods, but those that stated there was a decrease (18.5%) in procedures done were more than those that believed there was an increase (15.3) – Table 3.

Table 4: Use of media (telemedicine) for consultation before COVID and after COVID

Variables	**N**	**%**	**N**	**%**
Audio Telemedicine	**Before COVID**		**After COVID**	
No	109	69.4	96	61.1
Yes	48	30.6	61	38.9
Total	157	100.0	157	100.0
Video Telemedicine	**Before COVID**		**After COVID**	
No	150	95.5	124	79.0
Yes	7	4.5	33	21.0
Total	157	100.0	157	100.0
Internet App Telemedicine	**Before COVID**		**After COVID**	
No	136	86.6	107	68.2
Yes	21	13.4	50	31.8
Total	157	100.0	157	100.0

The number of surgery residents using an audio form of telemedicine increased from 48% in the pre-COVID period to 61% in the post-COVID period – Table 4. The number of those using video telemedicine was few, but there was still an increase from 4.5% in the PRE-COVID period to 21% in the post-COVID period. The number of units using different types of internet Apps for clinical consultations increased from 13.4 % in the pre-COVID period to 31.8% in the post-COVID period – Table 4.

McNemar's test demonstrated a statistically significant difference in the responses to the use of audio telemedicine before and after COVID (p = 0.011). McNemar's test was also statistically significant for the differences in responses before and after COVID for video telemedicine (p = 0.000) and internet App telemedicine (p = 0.000).

Table 5: Predominant Form of Lectures/Tutorials/Seminars

	Before COVID		After COVID	
Variables	**N**	**%**	**N**	**%**
Both were co-dominant	1	0.6	19	12.1
I am not certain	2	1.3	0	0.0
Physical	151	96.2	21	13.4
Virtual	3	1.9	117	74.5
Total	157	100.0	157	100.0

In the pre-COVID period, lectures, tutorials, and seminars were frequently delivered in person (96.2%), while in the post-COVID period, they were frequently done virtually (74.5%) – Table 5.

Pearson's chi-square test showed no statistically significant associations between the stage of training of the respondents and the responses on the predominant form of lectures, tutorials, or seminars used in the pre-COVID period ($\chi^2 = 1.15$, df = 3, p = 0.766) and post-COVID period ($\chi^2 = 2.01$, df = 2, p = 0. 367).

Table 6: Changes noticed in the academic activities of trainers and trainees post-COVID

Variable	**N**	**%**
Change Noticed in Attendance of Trainers to Lectures/Tutorials/Seminars		
A Decrease	76	48.4
An Increase	52	33.1
I am Not Sure	7	4.5
No Change	22	14.0
Total	157	100.0

Change Noted in Trainee Performance at Exams		
An Improvement	38	24.2
I am Not Sure	37	23.6
No Change	45	28.7
Poorer Performance	37	23.6
Total	157	100.0

It was observed that the number of those attending lectures, tutorials, and seminars by trainers decreased. However, a greater number of respondents (28.7%) observed no change in trainee performance during exams; 24.2% noted an improvement, while 23.6% had a poorer performance by the trainees – Table 6.

Table 7: Probability of recommending virtual programs and telemedicine consultations

Variable	**N**	**%**
Recommending Continuing Virtual Lectures/Tutorials/Seminars		
No	27	17.2
Not Sure	9	5.7
Yes	121	77.1
Total	157	100.0
Recommending Continuing Telemedicine Consultations		
No	33	21.0
Not Sure	30	19.1
Yes	94	59.9
Total	157	100.0

The majority of the respondents (77.1%) recommended that virtual lectures, tutorials, and seminars should continue – Table 7. Similarly, 59.9% of respondents also recommended that telemedicine consultations should continue.

Discussion

The COVID-19 pandemic has declined substantially, but some of the changes and effects it triggered have become permanent. One of these is the migration to virtual platforms and the fusion of virtual and physical platforms, which has gained worldwide endorsement. In the present study, the number of virtual lectures, tutorials, and seminars in the post-COVID period was observed to have increased. Virtual meetings and conferences over the internet existed before the COVID-19 era; however, the pandemic triggered a surge in their use due to the ban on large gatherings and other similar measures.[4,10] With the spread of COVID-19 rising and the accompanying dread of the disease, the number of daily users for virtual meetings like Zoom and Google Meet increased tremendously, reaching levels that were unimaginable in the pre-COVID era.[11] Many academic activities at many institutions like ours had to switch to virtual platforms, including weekly clinical conferences, morbidity and mortality review meetings, multidisciplinary meetings, and journal club reviews of journal articles by surgery residents.

The respondents in this study recommended that virtual lectures, conferences, and seminars should continue because of the benefits they offer. Many other studies reported that many training institutions had to rely on virtual platforms for lectures and other meetings, similar to findings in the present study.[10] One advantage of these virtual meetings is the increased attendance they attract and the ease of participation from diverse parts of the world.[6,9] Virtual platforms have made it easier to share surgical knowledge and current practices or procedures with low-income countries.[8] Virtual platforms made it possible to have affordable surgical education from experts in diverse fields across the globe, making remote learning feasible.[5] Virtual grand rounds were also part of the internet-based meetings used by many institutions.[11,12]

However, virtual platforms have a few disadvantages, like the loss of the social aspect of physical presence at conferences, which affects all participants in virtual conferences, especially junior residents, to varying degrees.[8] Conferences were known to serve as opportunities to get to know other researchers and discuss areas of common interest, as well as to mentor others to upgrade their practice. Residents get to know each other and establish relationships with their senior colleagues from distant places, which could open up opportunities for fellowship or scholarships, especially for those in low- and middle-income countries.

Also, many participants at virtual conferences do not give their full attention; they are prone to engaging in other tasks or activities. Rather than the unique effect of presenting to a large crowd, some have their experiences confined to their actual locations at the time of their presentations. Some present from the comfort of their bedrooms, while others listen with headphones while attending a dinner.

There were calls for social distancing during the pandemic, which governments enforced through lockdowns. Various aspects of telemedicine were seen as targeted solutions for social distancing in the healthcare system. Telemedicine or telehealth includes the use of telephones, text messages, emails, audio or video calls, and internet applications, especially social media platforms, used for patient consultations or reviews, regardless of the patient's location.[13-15] In the present study, there was an increase in the use of telemedicine, whether through audio, video, or internet-based communication, in clinical practice during the post-COVID period, with audio media being the most commonly used. Similar surges in telemedicine

use across different surgical specialties were observed in other studies during and after COVID-19.[14,16] Besides interacting with patients, specialists also had to review cases by analyzing images and videos of lesions and abnormalities sent by patients, other surgeons, or specialists. A study reported that telemedicine was used more frequently among older patients, above 40 years old, and for patients requiring surgical excision, it was more common among those with benign lesions.[17] Another study reported high rates of satisfaction with telemedicine among individuals living at farther distances from healthcare facilities.[18]

There was a decrease in major and minor cases after the pandemic, especially following multiple lockdowns, as was observed in the present study. During the pandemic, a resolution common in many countries was to reduce elective and nonessential surgeries by postponing or canceling them.[19] This affected the residency training/fellowship programs in terms of exposure to surgical patients and opportunity for hands-on surgery. Many resident doctors were unable to complete the recommended number of surgeries, and this affected junior residents more.[10,20] A good number of residents in a study done in the United States of America noted an advantage in the more time they had for research and personal study.[21]

The risk of transmitting COVID during minimally invasive surgeries led to a decrease in the number of procedures done during the pandemic and afterwards.[16] In the present study, more people observed a decrease in the number of surgical procedures than those who observed an increase. However, more than half of the respondents were either uncertain of any change, observed no difference, or did not respond to the relevant item in the survey. This pattern differed from that seen globally, but this may be related to the relatively lower number of minimal access surgeries done in the country, even in the pre-COVID period.

One of the prominent changes catalyzed by the pandemic is the globalization of surgical education. It is now common practice for all international conferences to have provisions or infrastructure for virtual attendance. There are various webinars and grand rounds organized by collaborations between two or more institutions available to surgeons training to become fellows. These made it possible for surgeons-in-training to learn directly from experts in other countries or continents. Another shift in the surgery fellowship is the preference for competency-based training over time-based training, which was limited by the decrease in surgical procedures performed during the pandemic. There was a need to rely on simulation-based training, especially virtual simulation. The traditional hands-on training where residents learn in person from their trainers is still considered the preferred form of training,[22] though it is insufficient. The pandemic made this quite obvious. The new trend in surgical training is seen in many countries that lean towards competency-based residency training in surgery, achieved through a combination of "face-to-face" training, simulation-based training, and other alternative resources of surgical education.[23] Other resources for surgical training include wet-lab training, stimulators, dry-lab training, digitally augmented box trainers, and live surgeries. pre-recorded surgeries, online courses, e-learning modules, as well as augmentation of other clinical activities with telemedicine, multiple virtual conferences, webinars, online lectures, and availability of long-distance mentors.[22] Many surgeons strongly recommend a hybrid curriculum that accommodates virtual platforms and conventional in-person training.[24]

The pandemic has induced the fortification of surgical training in diverse ways. However, there is no uniformity in the surgical training curricula worldwide, nor in the surgical procedures residents must be proficient in during the training for membership or fellowship.[18] Uniformity in the standards used for

surgical training is now possible due to multiple virtual platforms that promote the exchange of surgical information and training via simulation. There is also a need to push for uniform exposure of residents to other innovative surgical techniques, such as robotic surgery, as they become part of the curriculum.

Limitations of the Study

There is a possibility of recall bias due to the timing of the study. This would have been eliminated or minimized by carrying out the survey immediately after the COVID-19 period. The data was skewed towards residents in the South-Eastern region, which constitutes a significant proportion of the sample population.

Conclusion

The COVID-19 pandemic has fundamentally altered surgical training for fellowships, hastening the adoption of virtual platforms, simulation technology, remote teaching, and mentorship into many fellowship curricula. In this post-pandemic period, it is important to combine digital technological advancements with traditional hands-on training to create a flexible hybrid model of surgical fellowship that can be implemented globally. This produces clinically skilled and versatile surgeons who are equipped with a rich blend of surgical options that meet the demands of modern healthcare.

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